The Informal Workplace Learning Experiences of Virtual Team Members: A Look at the Role of Collaborative Technologies

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This qualitative study explored how collaborative technologies influence the informal learning experiences of virtual team members. Inputs revealed as critical to virtual informal learning were integrated, collaborative technological systems; positive relationships and trust; and organizational support and virtual team management. These inputs foster the processes and events within which informal learning occurs. Processes include learning from and with others. Events include virtual mentoring, coaching, knowledge sharing, criticism, problem solving, document creation/editing, and planning.

Keywords: Learning, Collaboration/Teaming, Technology

In the developed world, technology has become an essential component of the vast majority of jobs and therefore a fixture in the lives of most workers. Consider the following quote from the Center for Work, Technology, and Organization's (WTO's) web site (WTO, 2002): "We spend over half of our lives working. Work defines our identity and social status, gives us purpose, and shapes our social network. Work is also the basis for all organizing… In organizations, work gets done through technology." Technology's impact on work is especially powerful for *virtual* work teams, a growing segment of the work population, who depend substantially more on information and collaborative technologies than co-located teams (Gibson & Cohen, 2003).

Technology not only often serves as the primary means by which virtual workers interact and collaborate, but also how they learn during work. Marsick and Watkins (1990) theorized about the presence of learning in the workplace when they wrote that "…people learn in the workplace through interactions with others in their daily work environments when the need to learn is greatest" (p. 4). Despite their claim and the impact of technology on virtual work, the connection between learning situated in the everyday experiences of work and technology's facilitative role, especially among virtual workers, has yet to be thoroughly investigated by researchers.

Studies examining the interplay of technology and work (e.g., Coovert & Thompson, 2001; Grudin & Poltrock, 1997) as well as the interplay of technology and learning (e.g., Kirschner & Van Bruggen, 2004; Schenkel, 2004) exist, but few specifically seek to examine the intersection of the three entities: everyday work activities and interactions, technology, and learning. Such an examination is a worthy endeavor, considering how organizations are increasingly adopting the virtual team model and relying on technology to facilitate virtual team collaboration and learning. Research is needed to build foundational knowledge about the effects of work, learning, and technology on virtual team members. This new knowledge may be of value to organizations as well as the individuals who work in them.

Theoretical Framework

Virtual Team Work

Most research in the last 15 years devoted to virtual teams has revolved around two topics—computer-supported cooperative work (CSCW) and virtual team member relations. CSCW research considers technology's effect on virtual work, primarily through investigations of group decision support systems (GDSS), groupware, and other collaborative technologies. Research findings have shown that, in practice, technology has not been an overwhelming success in supporting collaborative work (Andriessen, 2003; Coovert & Thompson, 2001; Grudin & Poltrock, 1997). Studies have identified a number of technical and social/organizational challenges that jeopardize the success of virtual teams that use technology to complete organizational tasks. One challenge that has surfaced in a number of research studies is the ability of virtual team workers to build relationships with one another via technology. Relational aspects such as team psychological safety (Edmondson, 1999), trust (Hoag, Jayakar, & Erickson, 2003; Jarvenpaa, Knoll, & Leidner, 1998; Jarvenpaa & Leidner, 1999), effective communication (Hightower & Sayeed, 1995, 1996), and mutual knowledge (Cramton, 2001) have been shown to be important factors in virtual team success, but these studies also acknowledge that these factors are often lacking among virtual team members.

Workplace Learning

What is often overlooked in the virtual team literature is not only are teams working, they're learning while working — learning as they adapt to virtual team processes and routines, learning as they construct individual and shared knowledge, and learning as they adapt to technologies designed to enable learning and collaborative processes. According to Bitter-Rijpkema, Sloep, and Jansen (2003), these types of formal and informal learning are important to high performance professionals who are also permanent learners. Today's professional work requires that professionals learn to creatively use available knowledge and experiences to develop innovative solutions. Traditional approaches to professional learning and development, such as training sessions and performance support, neglect to facilitate "the learning required for collaborative, creative problem solving, learning to work with new methods and tools, and organizational learning" (Bitter-Rijpkema et al., 2003, p. 19). Scholars, such as (Resnick, 1987), have argued that learning should not be restricted to formal education and is best situated in authentic tasks performed in daily life and work. Brown and Duguid (1991) further advocated that work, learning, and innovation can and should be unified:

> Much conventional learning theory, including that implicit in most training courses, tends to endorse the valuation of abstract knowledge over actual practice and as a result to separate learning from working and, more significantly, learners from workers…knowledge-practice separation is unsound, both in theory and in practice. We argue that the composite concept of 'learning-in-working' best represents the fluid evolution of learning through practice. (p. 41)

A handful of researchers have investigated planned, organization-driven learning that occurs in the context of virtual work. E-mentoring (Bierema & Merriam, 2002), knowledge-sharing and management (Herrmann, Kienle, & Reiband, 2003), and computer-supported collaborative learning (CSCL) (Kirschner & Van Bruggen, 2004; Kreijns, Kirschner, & Jochems, 2002; Kreijns, Kirschner, Jochems, & Van Buuren, 2004) are a few examples of research topics undertaken to explore the integration of work and learning and its influence on learning and performance. This set of studies, though small, provides a foundation for understanding the importance of situating learning in authentic work-based tasks.

Informal Workplace Learning

While researchers have begun establishing a body of research for formal workplace learning, informal workplace learning as a purposeful research focus remains in a state of nascence despite the assertion of theorists and researchers like Marsick and Watkins (1990) who stated: "The potential exists to help people learn more effectively in the workplace by focusing on real life rather than on prescriptions, examples, and simulations" as is usually found in traditional training sessions (p. 4). Findings from a two-year research study conducted by the Education Development Center, Inc. (EDC) in 1997, which investigated informal learning in a number of major corporations, support Marsick and Watkins' statement. The EDC found that "70 percent of what people know about their jobs, they learn informally from the people they work with" (Cofer, 2000).

In light of this statistic, it is ironic that in advanced industrialized countries most research and theory development related to learning has been centered on formal education and training (Colley, Hodkinson, & Malcolm, 2002), especially when you consider the number of prominent scholars who have acknowledged the disconnect between what is learned in formal education/training settings and what is learned in practical life (e.g., Brown & Duguid, 1991; Lave & Wenger, 1991; Orr, 1996; Resnick, 1987; Rogoff & Lave, 1984). While there are a small number of research studies that consider informal workplace learning (e.g., Grolnic, 2001; Howe, 1991; Maben-Crouch, 1997; Wagner, 2001), more are needed to reveal the benefits of informal workplace learning and to discover ways to maximize those benefits. There is also a great need for studies that explore informal workplace learning in the context of virtual teams. Considering the proliferation of virtual teams it is important to examine how interaction and collaboration via technology enhance or inhibit the informal learning processes of virtual team members.

Research Questions

The purpose of this study was to explore how collaborative technologies enhance or inhibit the informal learning experiences of virtual team members. The following questions guided this inquiry:

1. How do virtual team members describe their informal workplace learning experiences as facilitated by technology?
    a. What are the perceptions of collaborative technologies among virtual team members?
    b. How do collaborative technologies facilitate or inhibit informal learning among virtual team members?
2. What cognitive, social, emotional, motivational, and contextual variables affect the informal learning of virtual team members? How do collaborative technologies impact those variables?

a. How do team psychological safety, trust, and mutual knowledge relate to informal learning in the context of virtual work? What role do collaborative technologies play in supporting those relationships?
b. How does the organization support or inhibit virtual team member learning that is informal and enabled by collaborative technologies?

Research Design/Methodology/Limitations

Qualitative researchers employ different strategies to understand how individuals make meaning. They choose their strategies by first considering their research questions and then choosing the strategies that best suit their investigation. Qualitative scholars define and categorize the strategies of qualitative research in different ways (e.g., Denzin & Lincoln, 2000; Merriam, 1998; Patton, 2002). For this study, I used the generic strategy of qualitative inquiry as characterized by Merriam (1998).

Basic or generic qualitative studies are those that possess what Merriam (1998) listed as the essential characteristics of qualitative research—"…the goal of eliciting understanding and meaning, the researcher as primary instrument of data collection and analysis, the use of fieldwork, an inductive orientation to analysis, and findings that are richly descriptive" (p. 11). Merriam deemed the generic study the most common form of qualitative educational research and distinguished it from other types of qualitative research by defining it by what it is not. Basic or generic qualitative studies, she wrote, "…do not focus on culture or build a grounded theory; nor are they intensive case studies of a single unit or bounded system…[they] simply seek to discover and understand a phenomenon, a process, or the perspectives and worldviews of the people involved" (p. 11). Other characteristics of the generic study include its theoretical draw from many disciplines, data collection methods such as interviews, and data analysis methods of thematic or categorical identification.

The generic strategy was most appropriate for addressing this study's purpose and research questions for two reasons. First, my goal was to discover and understand the phenomenon of informal learning as enabled by collaborative technologies. My purpose was not to build theory, nor did I study a single unit or bounded system. Second, as is characteristic of generic qualitative research, I will draw on theories from multiple disciplines, such as Instructional Technology, Human Resource and Organization Development, and Educational Psychology, to conduct this study. These reasons led me to select the generic qualitative methodology for this study.

Interviews are a frequently used qualitative data collection method (Bogdan & Biklen, 2003; Creswell, 2003; Merriam, 1998, 2002; Patton, 2002). I chose interviews as the primary method for gathering data concerning my research questions and used the critical incident technique (CIT) to prepare participants for interviews. Merriam (1998) advised, "Interviewing is necessary when we cannot observe behavior, feelings, or how people interpret the world around them. It is also necessary to interview when we are interested in past events that are impossible to replicate" (p. 72). Since it would have been impractical and intrusive to observe virtual workers as they engaged in informal learning, I chose to rely on interviews, during which participants could reflect on past incidents of informal learning. I also used the CIT to help participants reflect on past experiences. The CIT is a qualitative research method designed to "…capture the complexity of job behavior in terms of the job's social context" by collecting stories, episodes, or incidents about job behaviors crucial to successful job performance (Stitt-Gohdes, Lambrecht, & Redmann, 2000, p. 59).

Twelve virtual workers representing a diverse group of professions participated in the study. All but three worked from their home offices. They were selected based on the following criteria:

- The participant should be currently engaged in one or more virtual team projects. The participant's team members should not be located in the same building and have limited "in-person" contact with one another. Ideally, the participant's team members will be located in other states within the United States or in other countries. This criterion increases the probability that the participant engages in virtual work via collaborative technologies and meets criterion number two.
- The participant must use two or more collaborative technologies to accomplish virtual work and interact informally with fellow team members. Examples include virtual meeting systems, email, audio/video conferencing, interactive weblogs, wikis, and intranet sites.
- The participant must be willing to critically reflect on their informal learning experiences and participate in one 60-90 minute interview.

In analyzing interview data, I followed Ruona's (2005) step by step method for preparing, coding, and cross-analysis using Microsoft Word.

This study has several recognized limitations. They are as follows:

- I gathered data related only to technologies used by research participants.

- I focused only on *informal* workplace learning incidents, processes, and behaviors.
- A small sample size of twelve research participants limits this study's generalizability; however generalizability is usually limited in qualitative studies. Merriam (2002) argued, "A small sample is selected precisely because the researcher wishes to understand the particular in depth, not to find out what is generally true of the many" (p. 28).
- Time per participant was limited to one 60-90 minute interview. Such a time frame limits the depth with which I was able to analyze such a complex topic as informal learning in virtual teams.

Despite these limitations, this study generated useful insights as to how collaborative technologies enhance informal workplace learning among virtual team members for managers and workers in organizations that employ virtual team members similar to those in this study. The study may also stimulate further research in this area.

Findings

The findings of this study are presented in the following table and are organized by research questions.

Table 1: *Summary of Findings*

Research Question 1: *How do virtual team members describe their informal workplace learning experiences as facilitated by technology?* • Virtual team members described various instances of their informal workplace learning experiences as facilitated by technology. Informal learning experiences included instances of **virtual coaching, mentoring, and networking; knowledge sharing and management; making mistakes; problem solving; document creation and editing; and planning**.
Research Question 1a: *What are the perceptions of collaborative technologies among virtual team members?* • Virtual team members described their perceptions of collaborative technologies as followings: o Participants identified **email** as the most commonly used technology and characterized it as both a source of misconception and reflection. They viewed time lags inherent in this asynchronous form of communication both positively as they afforded time for reflection and negatively as they generated false assumptions as to why email responses were slower than expected. The difficulty in communicating tone through this text-based media also generated misconceptions. o **IM** was the second most commonly used technology and considered appropriate for short, quick exchanges. Its only drawback was its synchronous nature can be distracting and interrupt work. o Participants perceived **audio tools**, such as the telephone and teleconferencing, as more useful for complex tasks than email or IM, because tone can be communicated. o **Video tools**, such as videoconferencing and webcams, and have benefits and drawbacks. A very strong benefit is its ability to convey valuable visual cues, such as body language. Drawbacks include prohibitive cost, technical difficulties, and scheduling across time zones. o **Web-based collaborative tools**, such as discussion boards, were used to archive lessons learned, project information, and personal facts about virtual team members. o Participants cited using **knowledge repositories** housed on organization internets or intranets to access and contribute to work-related documents. o **Desktop sharing** is an important tool for collaboration that requires visual aids. o **Integrated collaborative suites** that combine these tools plus the ability to monitor and manage virtual projects are ideal.
Research Question 1b: *How do collaborative technologies facilitate or inhibit informal learning among virtual team members?* • **Informal workplace learning is a byproduct of everyday work tasks** as virtual team members collaborate on everyday work tasks**.** As a result, collaborative technologies facilitate or inhibit informal learning in the same ways they facilitate or inhibit work. • Technology's ability to facilitate or inhibit informal learning situated in work tasks is dependent on the **match between task and technology.** For example, simple, quick information exchanges are best accomplished by technologies such as email or IM; whereas, more complex tasks like problem solving or planning are best accomplished by desktop sharing, video or telephone conferencing. A mismatch results in effective communication and inhibits work and informal learning. It is important to negotiate at the start of a virtual work relationship or project which technologies will be used for which tasks.

Research Question 2: *What cognitive, social, emotional, motivational, and contextual variables affect the informal learning of virtual team members? How do collaborative technologies impact those variables?*

- Participants revealed the importance of **social relations, technological support, self-motivation, and flexibility** in work hours as contextual variables that impact their informal learning experiences.
- Collaborative technologies fuel their ability to build **relationships and trust** with their team members which, in turn, enhances their informal learning and collaboration.

Research Question 2a: *How do team psychological safety, trust, and mutual knowledge relate to informal learning in the context of virtual work? What role do collaborative technologies play in supporting those relationships?*

- A **healthy relationship** built from a sense of trust inspires virtual team members to share knowledge, and collaborate.
- Participants expressed that trust-building can be mediated by technology. Strategies for virtual trust-building included **setting and meeting expectations for work and communication and being courteous in virtual communications**. An initial, face-to-face kick-off meeting is a great way to jumpstart trust and relationship building among team members.

Research Question 2b: *How does the organization support or inhibit virtual team member learning that is informal and enabled by collaborative technologies?*

- The most important form of organizational support expressed by virtual team members was **technological support**. Organizations should not only provide collaborative technologies to virtual workers but also involve them in the selection and adoption of the tools that fuel their work and learning.
- Only one participant's organization had other **incentives**, such as performance bonuses, in place specifically for virtual team members. Other participants were subject to the same support mechanisms as co-located employees.
- The organization can also be supportive by ensuring **leaders are skilled in managing virtual team projects and team members**.

Conclusions and Recommendations

The purpose of this study was to explore how collaborative technologies influence the informal learning experiences of virtual team members. Inputs revealed in this study as critical to setting the stage for virtual informal learning are integrated, collaborative technological systems; positive relationships and trust; and organizational support and virtual team management. Having these inputs in place fosters the processes and events within which informal learning occurs. Those processes are learning from and with others and occur during events of virtual mentoring, coaching, knowledge sharing, criticism, problem solving, document creation/editing, and planning. The results of this study inspired and are represented in the Virtual Informal Learning System (VILS) model featured in Figure 1.

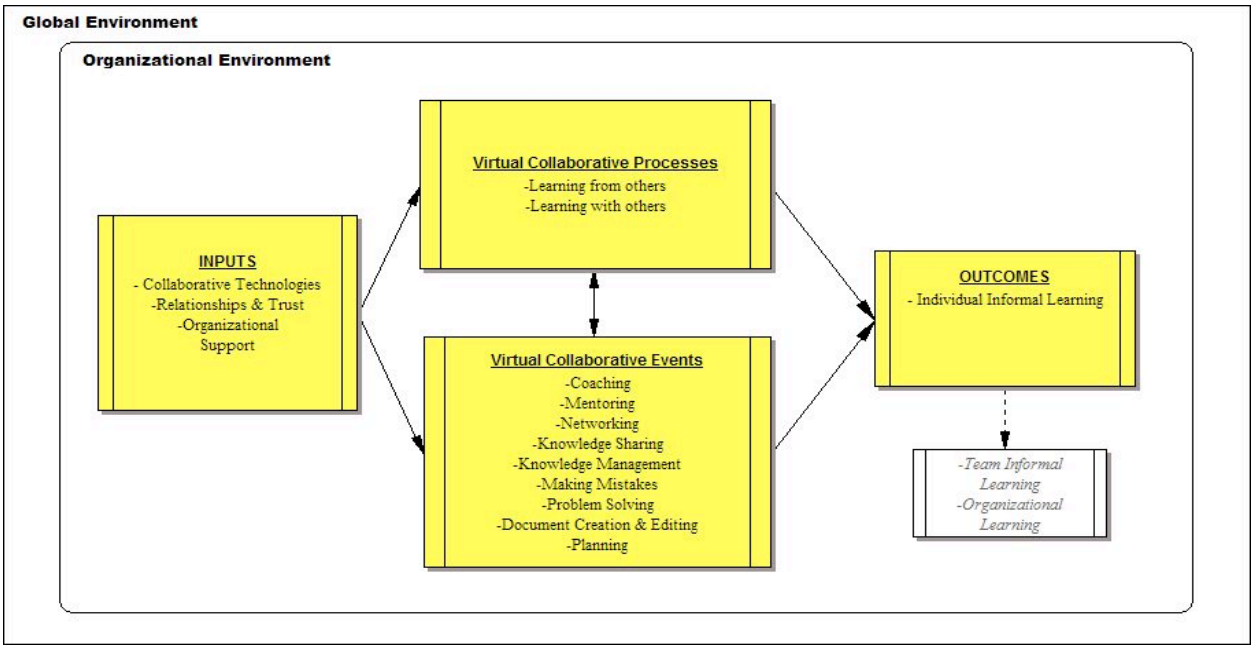

Figure 1. The Virtual Informal Learning System (VILS) Model

Implications and Recommendations for HRD Research and Practice

There are a number of implications for research and practice derived from the findings of this study related to the inputs of or contextual factors that cultivate virtual informal workplace learning. Since collaborative technologies, relationships and trust, and organizational support and leadership provide the context within which virtual informal learning occurs, researchers should design and conduct studies that further investigate the context of virtual work with these inputs in mind. This study was exploratory and therefore did not seek to discover in-depth findings of how contextual factors influence work and learning. More in-depth research should be conducted to uncover the nuances of each of these factors and discover what other contextual factors exist. Research studies using quantitative, qualitative, or a mix of methods in an actual organization would be ideal and might remedy the failure of a number of studies cited in the literature review that were conducted at a university with university students instead of at authentic work settings. Such contextual research might also add to the theories and models of informal workplace learning, for instance the renowned Marsick, Volpe, and Watkins model (1999), which established but does not detail the influence of context of informal learning. Future research studies might also investigate members of the same virtual team and the impact of various factors such as the level of expertise of virtual workers and the number of virtual projects assigned to a virtual worker.

The findings of in-depth research into the contextual factors or inputs that frame virtual informal workplace learning could inform practitioners about how to support virtual workers and enhance their informal learning experiences. The findings of this exploratory study provide practitioners with a place to start. As participants specified, they should help virtual workers understand the importance of and strategies for building relationships and trust and guide them in choosing appropriate technologies for work tasks. Managers of virtual teams need to provide this leadership and so must be knowledgeable in these matters as well. Organizations should also dedicate a staff member to researching the use and preferences of technology among virtual team members and recommending upgrades to old technologies or proposing the use of new technologies. Providing integrated collaborative technology suites that include technologies recommended or approved by virtual workers is critical to their success.

There are a number of implications for research and practice derived from the findings of this study related to the virtual processes and events that lead to informal learning. Since this was an exploratory study, I did not conduct an in-depth investigation into any one process or event that resulted in informal learning, but doing so is a worthy endeavor for future research. Qualitative studies that employ methods of observation as well as in-depth interviews may provide richer results into one or each of these processes and events, since informal learning is often tacit (Marsick & Watkins, 1990). Observations by researchers particularly attuned to learning processes would prove fruitful for investigating informal learning beyond what could be derived by interviews, because participants in this study had difficulty articulating their learning. They viewed many of their informal learning experiences not as

informal learning but simply as work. Even when provided with a definition of informal learning, they continued to struggle with determining what was considered informal learning. A researcher skilled in observing instances of informal learning may uncover deeper levels of analysis than may be possible through self-report interviews.

Practitioners are able to use the findings of this study related to the processes and events that lead to informal learning in a number of ways. Organizational leaders should encourage and reward virtual workers who engage in the processes and events identified in this study as leading to informal learning. For example, informal virtual mentoring could be incentivized by awarding virtual workers with performance bonuses for capturing lessons learned from virtual mentoring relationships and uploading them to a searchable knowledge management system so that others can learn from their relationship (Herrman et al., 2003). Providing virtual workers with time to do this would also be required, as participants indicated that lack of time was their primary reason for not contributing to knowledge management systems. Organizations should also ensure that virtual workers have the technologies in place that they need to engage in other informal learning events (Garavan, 1997) such as problem solving, planning, and collaborating on work products.

This study's strongest recommendation is that researchers should investigate in greater depth the contextual factors within which virtual informal workplace learning is situated and the processes and events that spark it. Practitioners can then implement the findings of those investigations to increase the informal learning of virtual workers. Researchers might also work in conjunction with practitioners to determine if increases in informal learning lead to increased performance among virtual workers

Contribution to New Knowledge in HRD

From a research perspective, this study provides a unique contribution to the virtual team and informal workplace learning literatures as it integrates the two topics and purposefully considers technology's impact on virtual work and learning. When combined with the results of other studies, the study's findings also help to inform the research of academics in a variety of disciplines, especially those interested in the intersection of instructional technology, performance technology, information and communication systems, and human resources development.

From a practical perspective, this study provides information to organizations that have virtual teams and to collaborative technology developers as to what activities and enabling tools facilitate informal, virtual learning processes and outcomes. It also reveals a number of best practices for virtual team success. The success of virtual teams is critical considering the following conclusion drawn by Duarte and Snyder (2001): "organizations that do not use virtual teams effectively may be fighting an uphill battle in a global, competitive, and rapidly changing environment" (p. 3).

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